ENTOMOLOGICAL NEWS

FEBRUARY 1946

Vol. LVII **No. 2**

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $3.00 domestic; $3.30 foreign; $3.15 Canada.
Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage prescribed for in Section 1. Act of October 3, 1917, authorized January 15, 1921.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. Editorial Staff: E. T. CRESSON, JR., E. J. F. MARX, J. A. G. REHN, A. G. RICHARDS, JR., and R. G. SCHMIEDER.

Subscription price, per yearly volume of 10 numbers: Domestic, $3.00; Foreign, $3.30; Canada, $3.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

ADVERTISING RATES: Full width of page. Payments in advance.

	1 Inch	2 Inches	3 Inches	6 Inches
One Issue	$1.00	$ 1.90	$ 2.75	$ 4.80
Five Issues	4.50	8.50	12.00	21.00
Ten Issues	8.00	15.00	21.00	36.00

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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VOL. LVII FEBRUARY, 1946 No. 2

Wasps and Water

By GARLAND T. RIEGEL, Capt., Sn. C., A. U. S.

Much has been written about the interesting habits of wasps by observers who have devoted years to this fascinating study. At the suggestion of Mr. Phil Rau, I wish to add a fragment to this mass of information—an observation made in North Africa upon a curious activity of one species.

During the height of the dry season in Tunisia during the summer of 1943, wasps were frequently observed alighting right on the surface of quiet pools and streams, picking up a load of the liquid and, when ready to return to the nest, taking off directly from the water surface. On July 17 near Mateur two of these relatively large insects were collected after they had settled on the water of the Oued el Malah at the village of Sidi Salem. They proved to be females of *Polistes gallicus* (L.) (det. Townes, 1945). I had often observed our American species walk to a pool for water after alighting nearby, but this behavior was new to me. Mr. Rau, however, has recorded this same remarkable procedure for four American *Polistes* (*pallipes, annularis, rubiginosis* and *variatus*), and given observations on their use of the water to cool the nests during hot, dry days in Missouri (1 & 2). Undoubtedly the same use was being made of the water in the semi-desert conditions then prevailing in Tunisia.

Mr. Rau states in a personal communication that there are a few records of Hymenoptera alighting on and taking off from water without breaking the surface tension, and that he has also recorded such behavior in the mining bee, *Anthophora abrupta,* but I have been unable to review the literature.

Polistes gallicus (Fig. 1) apparently has no structure on the tarsi other than eight fairly large setae on or near the claws

and the empodium that might assist in preventing the breaking of the water surface. Both the specimens collected are about eleven millimeters long, and after drying over 25 months weighed 17.74 and 20.74 milligrams respectively (after the aver-

FIG. 1. *Polistes gallicus* (L.), female

age weight of a large number of the same size insect pin was subtracted in each case). As insects go, this is fairly large and heavy, and its ability to "land" on water and take off again with a full load arouses admiration in the observer.

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2. ——. 1933. The Jungle Bees and Wasps of Barro Colorado Island (Rau, Kirkwood, Mo.), 324 pp.

Obituary

MR. ROSWELL C. WILLIAMS, JR., research associate of the Academy of Natural Sciences, Philadelphia, and a member of its Council, past recording secretary and past president of the American Entomological Society, student of the Rhopalocera and specialist in the Hesperiidae, died March 7. A sketch of his life will appear in a future issue.

On the Genus Trogloderus Le Conte (Coleoptera: Tenebrionidae)

By Ira La Rivers, Nevada Academy of Natural Sciences, Reno, Nevada

The genus *Trogloderus* Le Conte 1879, among other insects, may be likened to some of the weird extinct mammals exemplified by the titanotheres and uintatheres; like them, its members have embarked on that phase of evolutionary growth which seems to characterize any ancient group in the last stages of its existence—they are developing fluidly and rapidly into grotesque caricatures of their plain and drab ancestors. At first glance, to one uninitiated to the group, their deviation from the parent stock would seem of little moment in contrast to the apparently striking growths achieved by more noticeable elements among the scarabs—but among these latter, there are ready links to fit the chain when the group is viewed as a whole, thus reducing the total effect. The differentiation of *Trogloderus* is nearly as pronounced when the staid drabness of their predecessors is taken into account, and while they have not developed such eccentricities as horns, and probably never will, they have achieved a rugosity of prothorax and a costate elytral condition which will compare favorably with the excrescences which, in other animals, have been taken as indications of an explosive growth phase, generally purporting an early extinction of the line. As an additional indication, animals in this stage of evolution, with small exception, appear to have achieved their maximum adjustment to an environment which has for some time been relatively static—and perhaps this final flareup is merely an external expression of somatic flexibility which, unable to produce any variations of value to a system already in equilibrium, continues to exert its influence in meaningless changes in morphology. It is certain, and quite apparent, that in their initial stages such changes are neutral in character; they perform no useful function in adjustment, but seem not to militate against the adjustment. In the final stages even, they may not be of intrinsic importance in any elimina-

tion of the animal from the scene. Probably the greatest operative factor in the death of a line is the changing environment itself. Since all environments change eventually, and often with comparative suddenness, the well-adjusted animal is not able to meet the demands required of it to operate as part of the new flux and succumbs.

Trogloderus gives further indications of being in the initial phases of this flareup by the state of flux of its members. All subspecies possess pronounced elytral costation with small individual variation, but the rugosity of the prothorax is extremely variable, and almost defies classification. Differentiation has been based exclusively on these prothoracic variations, but they are of such complexity as to present a problem difficult of solution with adults only. There is considerable fieldwork yet to be done before these variations in the imago can be evaluated—however, enough is now known to indicate reliably the extent of these variables, and the chief objective now is to fill in the gaps, obtain the "missing links" of the line and to verify conclusively that which, until now, we have had to relegate to theory in the absence of all the facts.

When the author first reviewed the genus (1942), he added the species *nevadus* to the already described *costatus* and *tuberculatus*. It was evident that *nevadus* was closely allied to *costatus*, but in the absence of truly transitional elements, although the former was represented by an adequate series (14 specimens), there was no alternative but to give *nevadus* specific status, with the reservation that intermediates might be discovered with more extensive collecting. At that time, there were several specimens of undescribed variables in the collection of the California Academy of Sciences which it was not possible to work out, and so they were not included. A recent perusal of these has convinced the author that, in some respects, they show "missing link" characters still sought in the group, and make it possible to crystallize convictions which had hitherto been held only in theory.

The author is deeply indebted to Dr. E. C. Van Dyke for the privilege of examining the specimens of the California Academy of Sciences and for his kind and unstinting aid.

Subfamily Blaptinae

Tribe Eleodiini

Genus **TROGLODERUS** Le Conte

Trogloderus Le Conte, 1879, North American Entomologist.
Trogloderus Le Conte & Horn, 1883, Smithsonian Misc. Collections 507.
Trogloderus Blaisdell, 1909, U. S. N. M. Bulletin 63.
Trogloderus La Rivers, 1942, Annals Ent. Soc. Am., 1943, P. C. Jour. Ent. & Zool.

The distribution of the genus includes the western half of Nevada, southern California, northwestern Arizona, southwestern Utah, and southern Idaho. *Trogloderus* was erected to include the first described species, *costatus*. It is peculiar that no specimens have been found in eastern Nevada—*Trogloderi* have been found up to a line which almost exactly bisects Nevada from north to south, but not east of this line; yet their area of distribution curves around southern Nevada into Arizona and Utah. It is probable that they exist in some portions of eastern Nevada and remain to be discovered. Altitudes of collecting localities vary from 900 ft. in southern California to 6,300 ft. at Lake Tahoe, California, and the zonal range is from Lower Sonoran in southern California, Upper Sonoran over most of Nevada and Idaho, and Transition in Nevada and California. The group is primarily an eremophilous one, and is obviously a product of the Great Basin, perhaps much as we know it today, with arenophilous preferences. The most stable subspecies, *tuberculatus,* inhabits the southern limits of the generic range, which is the most static portion, lacking the extremes of temperature prevalent over the northern portions; this and the variable humidities, flora, etc., are reflected in the confusion of variants constituting the remainder of the *costatus* complex. It is also likely, in the case of these latter *costatus* variables, that Pleistocene Lake Lahontan which covered wide areas of west-central and northern Nevada in the geologically-recent past is responsible for much of the variation exhibited. (Geological estimates vary from 10,000 to 50,000 years ago for the last body of water to occupy the Lahontan basin proper.

This ancient inland sea is represented now only by such remnant desert lakes as Pyramid, Walker and the recently-dried Winnemucca, and the vast, white alkali flats known as Deserts or Sinks, stretching for over a hundred miles across northwestern Nevada, and now bearing a thin sheet of water only during the winter and spring rain season, being deserts in the most literal sense of the word during the rest of the year.)

Typical northern *nevadus* has obviously been influenced by the distribution of Lahontan waters. All the author's specimens have been taken within the confines of the old lake itself, while additional specimens are from well within the drainage system supplying the lake. It may be that this preference for the Lahontan system is merely the result of an arenophilous species seeking the best sand dune areas; in this case, the lake itself, which seems to have converted many thousands of tons of surrounding volcanic rock into fine sand along its numerous shores. After final recession of Lahontan, this sand has been gathered here and there, where consistent wind currents prevailed, into aeolian dunes, often of large size and extent, and on these *Trogloderi* have prospered.

Typical *costatus,* the most northern of the complex, is distributed from southern Idaho across north-central Nevada to the mid-eastern edge of California. While it has been found on two sand dune areas, one of which (Paradise Valley) it shared with *nevadus,* it alone of the entire genus, in the author's experience, has been taken in typical Upper Sonoran sagebrush (*Artemisia tridentata*) and Transition pine timber (*Pinus ponderosa jeffreyi*) country. In the vicinity of Reno, it is a common species along the cottonwood (*Populus trichocarpa* and *P. fremonti*) choked Truckee river-bottom, while it has been found at other spots on the eastern face of the humid Sierras, as well as at middle altitudes in the Sierras themselves. It is too early to conjecture on the origin of the group, but their initial invasion of the Sierras at this, the only known point, may have been accomplished by following the Truckee river from its desert mouth to its source in these mountains.

The four new specimens tentatively referred to *nevadus,* and detailed more fully under the discussion of that form, have no

connexion with the Lahontan system and are obviously, although seemingly not now technically separable, of different origin than the northern series. Little can be said of *vandykei* since but one specimen is known.

The author's previous key (1942) is modified below to include the new form, as well as to reflect the present status of those remaining.

1. Pronotum entirely tuberculate on dorsum
costatus tuberculatus
Pronotum reticulate, at least in the center of the disc....(2)
2. Pronotal median foveae deep, distinct, separate
costatus costatus
Foveae absent or faint and connected, appearing as a shallow furrow .....(3)
3. Pronotum entirely reticulate, smoothly rounded on top
costatus nevadus
Pronotum tuberculate along marginal bands, dorsum bilobed on cross-sectional view.....*costatus vandykei*

Trogloderus costatus costatus Le Conte

Trogloderus costatus Le Conte, 1879, N. A. Ent., Jan. 1, p. 3, pl. 1, fig. 3.
Trogloderus costatus Le Conte & Horn, 1883, Smiths, Misc. Colls. 507.
Trogloderus costatus Blaisdell, 1909, U. S. N. M. Bull. 63.
Trogloderus costatus La Rivers, 1942, Annals Ent. Soc. Am., 1943, P. C. Jour. Ent. & Zool.

No new distribution records can be added to the published account of this variable, but some diagnostic features should be elucidated. Size within the confines of typical *costatus* varies from 10 mm. to 15 mm. (including both sexes), and color ranges of living mature material are from jet black to a weak purplish-brown, with the teneral light brown commonly met in the field. Pronotal reticulation varies from fine and evenly-spaced to large and irregular. The posterior pronotal margin is evident on most specimens unless the foveation is extreme, when the marked crenulations and buckling of the pronotal dorsum invade and destroy the continuity of the margin. In these cases, the reticulum is markedly elevated above the plane of the side pronotal margins, which are relatively smooth and flat, as a

plateau above the surrounding plain. A marked, but never complete, breaking down of the intervening reticula between the foveae is noted in many of these extreme specimens. Generally, the sinuosity of the pronotal marginal outlines is gently and progressively curved, but some of the extreme forms evince the more marked outlines characteristic of an occasional *tuberculatus* and of the lone specimen upon which *vandykei* is based, but these lack the complete marginal serration of *vandykei—tuberculatus*.

Trogloderus costatus nevadus La Rivers

Trogloderus nevadus La Rivers, 1942, Annals Ent. Soc. Am., December 4/35: 437–440, 1943, P. C. Jour. Ent. & Zool.

There is no additional distributional datum to be added to the northern forms. The length variation is from 8 mm. to 11 mm., averaging considerably less than *costatus*. The purplish-brown color is much more common than in *costatus*, but black specimens are not rare; the teneral light brown often predominates in many sandy localities where *nevadus* is the only form present. All specimens of *nevadus* examined possess well-defined posterior pronotal borders, and the reticulations are, almost without exception, small and regular, in consequence of which the cross-sectional view of the pronotal dorsum shows a smoothly-curved outline, and appears nearly flattened from above, in contrast to the generally roughly-broken *costatus* pronotum. Nearly all specimens are consistent in the possession of a suggestion of the two distinct median foveae of *costatus* and *tuberculatus*, either as faint depressions caused by a lowering of the reticule walls, or as a widening at front and rear of the narrow median furrow.

Among the California Academy of Sciences specimens recently examined are four I am referring to *nevadus* on the basis of pronotal structure, but which are considerably larger than the average of the specimens hitherto known under the name. The largest of these reaches 15 mm., the maximum of *costatus*, and all are jet black. All came from southern California: Kern County (Randsburg, 5/IV/27, el. 2,500 ft., Thos. Craig), San Bernardino County (Yermo, 9/VI/40, el. 2,100 ft., W. F.

Barr & K. S. Hagen). The author is only generally familiar with the Randsburg locale, but spent a month collecting in the Yermo region, which contains considerable areas of sand dunes and sandy soils, from which these specimens seem to have come; these are similar to typical *nevadus* habitats in Nevada. In fact, the form is known only from such environs. While there is yet little of a concrete nature to bulwark the supposition, it may be that these specimens represent a southern variable in the process of formation, for they are incongruous when assembled with the northern specimens.

Trogloderus costatus vandykei n. subsp.

The jet-black variable is described from a single specimen in the collection of the California Academy of Sciences, taken by Dr. E. C. Van Dyke in San Bernardino County (Baker, 22/V/25, el. 920 ft.). While more material will be needed to evaluate finally the form's position in the complex, the fact that no further specimens have been taken in the 20 years since its initial discovery makes it necessary to utilize this unique in completing a survey of the entire group. Of all the specimens so far unearthed, this alone seems to combine elements of all the other known forms. The conspectus is that of the genus, which has been admirably given by Blaisdell (1909), and the differential diagnostic features are mentioned below. It differs from most other variables in (1) possessing reticulations over the center dorsum of the pronotum and tubercles along the lateral margins, thus suggesting the affinities between *costatus* and *tuberculatus,* and (2) carrying distinct serrations the entire distance of its lateral pronotal margins, which margins in turn are distinctively sinuate, flaring out in a pronounced bulge near its caudad end before bending back sharply to end at the posterior pronotal collar. This pronounced sinuosity plus the entire serrations is found only in *vandykei* and some *tuberculatus,* although, as mentioned, some extreme *costatus* show a similar sinuosity, in which case the posterior half of the lateral edge producing the sinuosity is smooth and free of serrations; in most *nevadus,* and many *costatus,* serrations are common the entire lateral edge of the pronotum, but the sinuosity in these is naturally symmetrical in the manner of an unstrung bow, bulging evenly in the middle,

and tapering gently on either side. In this set of characters in *vandykei* can be seen obvious ties between *costatus* and *nevadus*.

Vandykei possesses a shallow median pronotal furrow as in *nevadus,* with a mild but noticeable widening at the posterior end, an incipient fovea. Although *vandykei* has a relatively smooth pronotal surface, as does *nevadus,* unlike the rough dorsum of *costatus,* in cross-section it differs from *nevadus* in exhibiting a bilobed appearance due to two parallel, rounded ridges lying in the center of the disc on each side of the median furrow, whereas in *nevadus,* such a section presents a smooth curve across the center. *Vandykei* also resembles *nevadus* in the relative smoothness of the elytra between their conspicuous costae, both lacking the pronounced cross-ridging usually present in *costatus* and *tuberculatus*. These cross-ridges, however, even when strongest, never compare in height with the costae themselves. Another feature shared between *vandykei* and *nevadus* is the near obliteration of the median elytral costa, especially in the anterior half; this is generally well-developed in *costatus* and slightly less so in *tuberculatus*.

The following table will serve to formulate these differences more fully:

	T. c. costatus	*T. c. nevadus*	*T. c. vandykei*	*T. c. tuberculatus*
TUBERCULATIONS ON PRONOTUM	none to faintly on extreme lateral margins	same as *costatus*	on lateral margins only	entire pronotum
SERRATIONS ON PRONOTAL EDGES	complete to incomplete	complete	complete	complete
SINUOSITY OF PRONOTAL EDGES	regular to irregular	regular	irregular	regular to irregular
MEDIAN ELYTRAL COSTA	prominent	repressed	repressed	prominent
PRONOTAL MEDIAN FOVAE	prominent distinct and separated	obsolescent	obsolescent	prominent distinct and generally separated
ELYTRAL INTRA COSTATE RIDGING	pronounced	repressed	repressed	pronounced

Trogloderus costatus tuberculatus Blaisdell

Trogloderus tuberculatus Blaisdell, 1909, U. S. N. M. Bull. 63: 490–492, pl. 6, fig. 14.
Trogloderus tuberculatus La Rivers, 1942, Annals Ent. Soc. Am.

There is little to be added to what is already known of this variant. It rivals *costatus* in size, and has been diagnostically delineated in the preceding discussions. However, one of the California Academy specimens shows considerable foveal obliteration and coalescence, approaching *nevadus* in this detail; all other specimens seen have possessed deep, distinct foveae resembling those of *costatus*.

In conclusion, it may be said that *tuberculatus* is perhaps the most distinctive and readily-differentiated subspecies of the entire group, and *vandykei* with its partial tuberculation indicates the affinities of *tuberculatus* with the remainder of the *costatus* complex. At the present state of our knowledge of the species, *costatus* is a variable compounding of four recognizable entities and probably others, as yet unknown and undescribed, whose eventual appearance will undoubtedly be of aid in resolving the problem of relationships. Complete solution, however, will depend, in the author's opinion, on a thorough study of larval and pupal chaetotaxy. Many groups of tenebrionids show similar tendencies, particularly the ELEODIINI and CONIONTINI within the author's experience, in which the immature forms possess differential characters completely lost in the adults; even genitalia fail miserably in attempts to analyse satisfactorily the differences between many adults of *Eleodes* and *Coniontis*, and the *Trogloderi*, like certain other ELEODIINI, have a generalized type of genital construction which possesses no adequate specific diagnostic characters.

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Texas Lepidoptera (Rhopalocera: Papilionoidea)

By Don B. Stallings and J. R. Turner, Caldwell, Kansas

When H. A. Freeman moved to Pharr, Texas in 1944, he immediately began to make some remarkable catches of butterflies in that vicinity.* From the butterflies caught at Pharr and the surrounding territory we are of the opinion that this area of the Rio Grande Valley is in the Tropical Zone (the same as Southern Florida) rather than in the Lower Austral Zone. Late life zone maps of North America do not indicate this area to be tropical; however, the life zone map by C. Hart Merriam corrected to Dec. 1897 as published in Bulletin No. 10, U. S. Dept. of Agric., Division of Biological Survey, 1898, shows this area to be tropical. There are other indications which tend to prove this to be true.

Mr. Freeman's interests are chiefly with the skippers (Hesperioidea) and hence he has passed on to us for determination most of the other Rhopalocera. In addition he has contacted several other collectors in the vicinity, all of whom have been most generous with their finest specimens. In as much as a number of these represent new records for the United States, some of which are native, we asked Dr. Wm. P. Comstock of the American Museum of Natural History to check our determinations. We wish to give our thanks for his valuable assistance.

Since many collectors will want references to these new records we have given some data on the literature. To save space we will refer to "Macro-Lepidoptera of the World,"

* See also Ent. News, vol. LVI, No. 1, p. 4, and Ent. News, vol. LVI, No. 4, p. 102.

Vol. 5, edited by Seitz, simply as "Seitz," and "Biologia Centrali Americana" (Lepidoptera-Rhopalocera), by Godman and Salvin as G. & S.

The following list is by no means complete, but includes only the more interesting and unusual catches.

Papilio polydamus L. A number of specimens were collected at Pharr in July, September and October. It can be considered native.

Papilio ornythion Bdv. Thus far only a few specimens have been collected by Mr. Freeman during September, but this species should be native to the area.

Papilio anchisiades idaeus Fabr. Freeman collected two specimens on May 12th, 1945, at Pharr. Seitz gives the food plant of this species as "Citrus," so we see no reason why this should not be native in southern Texas.

Anteos maerula Fabr. A single specimen of this large species was collected in August and a number of other specimens seen. It appears to be native.

Phoebis philae form *obsoleta* Niep. One specimen of this form was collected in August. The species should be native in this region.

Eurema daira Godt. (?). A female albino of this species was collected in October by Freeman. Until other specimens are collected we will not know for sure whether it is of the typical race *daira* or race *lydia* Felder, although we are inclined to think it is *daira*. In any event this specimen can be referred to as form *pallidula* Klots as this name should be sufficient for all albinos of this species.

Eurema proterpia Fabr. Flies in good numbers in September and into October.

Eurema proterpia f. hiem. *gundlachia* Poey. This winter form begins to appear in October.

Eurema nise perimede Pritt. This race appears to be common at Pharr, showing a distinct summer and winter form. The best collecting period is in September and October.

Appias drusilla Cramer. This species until of late has gone under the name of *Appias ilaire* Godt. It is native in this area, collected during August, September and October.

Ascia josephina josepha S. & G. This race was collected in September and October. Undoubtedly native.

Danaus eresimus montezuma Talbot. A series of this race was collected by Freeman at Pharr during September and October. Dr. Comstock advises us that the A. M. N. H. has a series collected at Brownsville, Texas, in December which are considerably smaller than the specimens collected by Freeman. It is probable that this race shows seasonal variation. See Talbot, "Revisional Notes on the Genus *Danaus* Kluk" (Lep. Rhop. Danaidae), Trans. Royal Ent. Soc., London, 93: 115–148. Native in southern Texas.

Heliconius petiveranus Doubleday. This beautiful specimen was collected in August at Pharr by Mrs. J. A. Cook and represents a fine new record for the United States. The species is well depicted on plate 78b Seitz under the name *petiverana* D. & H. This must be considered a stray in the United States.

Dryas julia moderata Stich. This distinctive race is native to the area and is collected during August and September.

Euptoieta hegesia hoffmanni Comstock. This newly described race is native and is in full flight in September. For original description see Comstock, "Insects of Porto Rico and the Virgin Islands," vol. XII, part 4, page 446, note 1.

Melitaea theona thekla Edw. This race is native to the area, being collected in October, March and April.

Melitaea elada callina Bdv. Another native collected during October.

Chlosyne janais Dru. A native species collected during October.

Chlosyne endeis G. & S. A native species collected during October.

Chlosyne lacinia californica Wright. Several specimens of *lacinia* caught at Pharr in October can not be distinguished from California specimens of *californica,* hence at best *californica* is not more than a race of *lacina,* though at Pharr it occurs as a form.

Biblis hyperia aganisa Bdv. A single specimen was collected by Mrs. E. J. Kelso in July at Pharr. This represents another fine new record for the United States. This race has previ-

ously gone under the name of *Didonis biblis aganisa* Bdv. For picture see Seitz, Plate 94f. See also, Comstock, "Insects of Porto Rico and the Virgin Islands," page 460. A second specimen was seen by Freeman in February in an orange grove, but for the time being we must consider this as a stray.

Anartia jatrophae luteipicta Fruhst. A native, best flight in September and October.

Anartia fatima Fabr. Common during March and April.

Victorina stelenes biplagiata Fruhst. In flight during August. It should be native.

Victorina stelenes biplagiata f. *pallida* Fruhst. This winter form flies during December and January.

Myscelia ethusa Bdv. Probably a native. Flies in October and December.

Cyclogramma asteria (G. & S.). One specimen collected by D. Ring at Almo, Texas, in July. This is a further new record for the United States, but must be considered a stray. The species is well pictured in G. & S., plate 108, figs. 31–32.

Timetes chiron Fabr. A single stray was collected in February.

Athena petreus Cram. A single stray was collected in February.

Adelpha fessonia Hew. Freeman collected a specimen in August, a second specimen in October and a third in November. There is a chance that this species may be native as the specimens are in good condition. For pictures, see Seitz, plate 109c and G. & S. plate 29, figs. 18–19.

Chlorippe pavon Latreille. Mrs. Freeman had the good fortune to capture the first specimen of this new record for the United States in October. A second specimen was caught in May. These specimens do not look like the figure shown in Seitz on plate 110Bc but are very similar to *laure* Dru. pictured at 110Be. Probably a stray in the United States.

Anaea glycerium Doubleday. A single specimen was collected by Mrs. E. J. Kelso in July at Pharr. This species is shown in Seitz at plate 118c. We would judge that the specimens shown in Seitz represent the winter form as they are

darker and more heavily marked than the Pharr specimen. This is another new record for the United States.

Anaea pithyusa Feld. Several specimens (all badly worn) have been caught at Pharr. For picture, see Seitz, plate 118f. One specimen of the winter form of this species was caught at Pharr on March 2nd, 1945. It looks a great deal like *Anaea cubaena* Bsd. as shown by Seitz on plate 118f. We are inclined to treat *cubaena* as the winter form of *pithyusa* however, Dr. Comstock is not so sure of this. In any event *pithyusa* has a winter form that looks just like *cubaena,* as pictured by Seitz.

Apodemia walkeri Godm. Native to the region with main flight in October.

Emesis emesia Hewitson. Mr. Freeman collected a good series of this new record for the United States in October and November at Pharr. This species has a well developed bulge on the costa of the forewing. See "Exotic Butterflies," Hewitson, vol. 4, plate 45, fig. 7.

Lasaia sessilis Schauss. There has been some confusion about this genus and its occurrence in the United States. This particular species is often confused with *Lasaia agesilas narses* Staud. both of which are supposed to be native in Texas, although Freeman has not as yet caught *narses. Sessilis* undoubtedly is the species that Holland was speaking about in his "Butterfly Book" when he mentioned *Lasaia sula* Staud. at page 216. Mr. Freeman sent these specimens to us identified as *narses.* The Stallings-Turner Collection had a series of specimens caught at Victoria, Mexico, which we had identified as *sessilis.* Seeing that the specimens we had received from Freeman did not correspond to Holland's picture of *narses* or to our Mexico *sessilis* we decided that the Texas specimens were probably the *sula* mentioned by Holland. The whole mess was passed on to Dr. Comstock who determined the Texas specimens as *sessilis* and our Mexican specimens as *sula.* It might be well to mention that our Mexican specimens agree with the Seitz figure of *sessilis,* much better than do the Texas specimens. Dr. Comstock remarks that the genus is variable and a big series would be needed for study.

Thecla bazochii Godart. Another new record for the United States collected by Freeman in October and May at Pharr. It is a native of the area. This species has usually gone under the name of *Thecla thius* Hbn. For figures see Seitz, plate 145i, k; Geyer, "Zutrage Sammlung Exotische Schmetterlinge," plate 619 (128), figs. 743–744; Hewitson, "Diurnal Lepidoptera," vol. 2, plate 58, figs. 369–370. See also Comstock and Huntington, "Lycaenidae of the Antilles." Annals of N. Y. Acad. of Sciences, vol. XLV, art. 2, page 88.

Strymon simaethis Dru. This species is also native to the area and is collected in October.

Strymon columella istapa Reak. Appears to be common in January, February, March, April, May, September and October.

Strymon laceyi (B. & M.). One female was collected by Freeman in October. This is one of the least known species in North America. So far as we know the type and this specimen are the only specimens known. We have compared this specimen with the pictures of the type and find them alike although the Freeman specimen represents the winter form, being somewhat darker. The type, also a female, was caught at Del Rio, Texas, July 9th. We join with Comstock and Huntington in considering this a good species, although the fact that no males have been caught does suggest the possibility that we may be dealing with a rare female form of some other species.

Strymon clytie Edw. This species which is still rare in most private collections is collected during August, September, December, April, May, June and July.

Strymon azia Hew. This tiny hairstreak is native to the area although nowhere common. Collected in April and May.

Mitoura xami Reak. A series of this native was collected in October.

While this paper is factual it does have some of the characters of a fish story, so it will not be amiss to mention the "one that got away." March 25th, 1945, Mr. Freeman wrote us, "I am still cussing for something I missed this afternoon. Today I chased a *Morpho* and finally lost it in the maze of jungle. It was orange beneath and very shiny blue above."

Dragonflies (Odonata) Collected in Pennsylvania and New Jersey in 1945.

By George H. Beatty, III, Merion, Pennsylvania

(*Continued from page 10*)

In the following list of species, full data are given for all captures of species which may be of interest. Briefer data are supplied for the better known species for which extensive information on their distribution, etc., is already available. Locality names refer to the preceding list of collecting stations. The location of localities other than those visited by the writer is noted briefly as they occur in the list of species. These supplementary records are indicated by the collector's name which follows them in parentheses. The order of species and, but for a few changes resulting from more recent knowledge, the nomenclature are based upon those of Needham and Heywood.[6]

ANNOTATED LIST OF SPECIES

Progomphus obscurus Rambur.

New Jersey: Whitesbog, 2♂, 24 June; 4♂, 1♀, 8 July; 1♂, 22 July.

This species was found only along the larger drainage ditches of the cranberry bogs where it squatted in characteristic fashion on the little sand bars and beaches. It was most abundant on 8 July when nearly every suitable spot had an *obscurus* squatting on it.

Hagenius brevistylus Selys.

New Jersey: Fisher's Dam, 1♀, 21 August.

The female was captured when it alighted on the sandy shore of the lower lake, near the outlet. Other females of *Hagenius* were ovipositing in the small streams at the outlet on 21 and 28 August, though none of this species was seen on 31 August or 4 September. When not flying over the water, they usually perched on high dead branches near the stream. On such a

[6] A Handbook of the Dragonflies of North America. Charles C. Thomas, Springfield, Ill., 1929. Pp. viii + 378, ill.

perch, one *Hagenius* was found on 28 August, eating a *Libellula incesta*.

Gomphus lividus Selys.

PENNSYLVANIA: Wyola, 1 ♂, 1 ♀, 17 May; 1 ♂, 25 May; 1 ♂, 29 May; 1 ♀, 6 June; Broomall, 1 ♂, 1 ♀, 22 May; 1 ♂, 25 May; 2 ♀, 29 May; Darby Creek, 1 ♂, 6 June.

Gomphus exilis Selys.

PENNSYLVANIA: Central Square, 4 ♂, 7 ♀, 22–29 May.

NEW JERSEY: Whitesbog, 1 ♀, 29 April; 1 ♂, 20 May; Upton Ponds, 1 ♀, 24 June; 1 ♂, 30 June; 1 ♀, 8 July.

Gomphus descriptus Banks.

PENNSYLVANIA: Slab Cabin Run, 1 ♂, 17 June. Field about 1 mile from Slab Cabin Run, 1 ♀, 19 May. (J. Gillespie.)

This species has not heretofore been reported from Pennsylvania though several other collectors have taken it in the state.

Gomphus villosipes Selys.

PENNSYLVANIA: Central Square, 1 ♀, 22 May.

This female is the only *villosipes* seen in 1945.

† **Dromogomphus** sp.

PENNSYLVANIA: Broomall, 1 ♀, 20 July.

The color of the hind femora, which are largely yellow, and differences in venation and the structure of the vulvar lamina distinguish this specimen from *D. spinosus*.

Dromogomphus spinosus Selys.

PENNSYLVANIA: Broomall, 1 ♀, 20 July; 1 ♀, 26 July; 1 ♀, 1 Aug.; seen at Broomall, 7 Aug. and Westtown Lake, 3 Sept.

Although this species is usually found at ponds and lakes, there are no such habitats within several miles of the fields where it was collected.

† After the ms. of this paper was completed, Dr. Calvert and the writer compared this specimen with others of both *spinosus* and *spoliatus* from several localities. Since specimens of a third species, *D. armatus* Selys, are not presently available, and because this specimen differs as much from *spoliatus* as from *spinosus*, no final decision has yet been reached on its identity. The results of further investigation will be published in the near future.

Lanthus parvulus Selys.

PENNSYLVANIA: Wyola, 1 ♂, 1 ♀, 25 May; 3 ♂, 4 ♀, 29 May.

None of this species was found when the same locality was visited on 6 June, though it was abundant on 29 May. It was undoubtedly a case of "explosive" emergence and dispersal such as is frequently reported for gomphines. In sunny clearings in the woods *parvulus* flitted slowly about, the males often perching high up in the small trees while the females stayed close to the ground. This is a new record for the Philadelphia region.

Gomphaeschna furcillata Say.

PENNSYLVANIA: Bear Meadows, 1 ♂, 2 ♀, 16 June.

NEW JERSEY: Upton, 3 ♂, 29 Apr.; 1 ♀, 5 May; 1 ♂, 2 ♀, 13 May.

This was the most abundant species along the pine-barren roads in late April and early May. Many were seen in addition to those captured. At Bear Meadows several pairs in coitu were seen but no oviposition was observed.

Basiaeschna janata Say.

PENNSYLVANIA: Wyola, 1 ♀, 26 Apr.; seen at Bear Meadows, 16 June and at Spring Creek, 18 June.

Boyeria vinosa Say.

PENNSYLVANIA: Broomall, 4 ♂, 23 July–8 August; Darby Creek, 2 ♂, 29 August.

NEW JERSEY: Seen at Fisher's Dam, 28 Aug., 4 Sept.; Friendship Creek, 4 Sept.; Clark's Brook, 7 Sept.

In the fields at Broomall, *vinosa* was very abundant late in July. It flew in the shade and hung up frequently among the leaves of shrubs and small trees, much like many of the tropical Aeschnines. During the period when it was common in the fields, no *vinosa* were found along the nearby streams. It later became extremely abundant along Darby Creek.

Anax junius Drury.

PENNSYLVANIA: Broomall; seen at the following: Central Square, Bear Meadows, State College, Crum Creek Farm, Holmes, Tinicum Marshes, 6 April–8 October.

NEW JERSEY: Cape May City, Cape May Point; seen at Upton Ponds, Pond near Fisher's Dam and Batsto Pond, 24 June–22 September.

Anax longipes Hagen.

NEW JERSEY: Upton Ponds, 1 ♂, 24 June; 1 ♂, 29 June; 1 ♂, 30 June; 1 ♂, 8 July; seen, Upton Ponds, 22 July, 12 August.

On 29, 30 June, this species was very abundant, at least twenty individuals being present at the ponds. They often flew slowly along the banks, hovering here and there, and then dashing far out over the water. After this date, they diminished in numbers until only one or two were left on 12 August.

Epiaeschna heros Fabricius.

PENNSYLVANIA: Seen at Bear Meadows, 16 June.
NEW JERSEY: Seen at Cape May City, 22 September.

Aeschna umbrosa Walker.

PENNSYLVANIA: Broomall, 1 ♀, 27 August; Holmes, 2 ♂, 5 October; Tinicum Marshes, 1 ♀, 8 October.

Seen on many other occasions, until 18 October.

Aeschna constricta Say.

PENNSYLVANIA: Tinicum Marshes, 2 ♂, 2 ♀, 26 Sept.; 3 ♂, 2 ♀, 29 Sept.; 1 ♀, 5 October.

Capture of ovipositing females of *constricta* furnishes evidence that this species breeds as far south as Philadelphia. A number of males have been taken previously, but these females (3 homoeochromatic and 2 heterochromatic) are the first to be recorded from Pennsylvania. They were all ovipositing on young green shoots of Typha which grew at the extreme edge of the marsh and which were in the water only at high tide. When the dragonflies were captured, they were ovipositing on these shoots about six inches above the ground which was at that time dry. Many males flew up and down the edge of the marshes, only a foot or two above the ground.

Aeschna tuberculifera Walker.

PENNSYLVANIA: Holmes, 3 ♀, 13 Sept.; 1 ♀, 21 Sept.

These females were taken as they oviposited on the sedges growing in shallow water.

Aeschna verticalis Hagen.

PENNSYLVANIA: Holmes, 2 ♂, 3 ♀, 13 Sept.; 3 ♂, 3 ♀, 21 Sept.

Cordulegaster obliquus Say.

PENNSYLVANIA: Shingletown Gap, 4 miles southeast of State College, Centre Cy., 1 ♂, 1 ♀, 9 June (J. Gillespie).

Cordulegaster diastatops Selys.

PENNSYLVANIA: Wyola, 1 ♂, 22 May; 1 ♀, 29 May; 1 ♀, 6 June; seen at Bear Meadows, 16 June.

Cordulegaster maculatus Selys.

NEW JERSEY: Upton, 1 ♂, 29 April; 2 ♀, 20 May; seen, Upton, 24, 29 June.

In the early spring, *maculatus* flew very languidly along the sandy roads. Late in June, this species was seen flying along a road at great speed, late in the afternoon.

Macromia illinoiensis Walsh.

PENNSYLVANIA: Broomall, 1 ♂, 5 August.

The only *Macromia* seen in 1945.

Didymops transversa Say.

PENNSYLVANIA: Wyola, 1 ♂, 1 ♀, 26 April; 2 ♂, 1 ♀, 17 May; 1 ♀, 22 May; 1 ♂, 25 May.

Epicordulia princeps Selys.

PENNSYLVANIA: Seen at Spring Creek, 18 June, Westtown Lake, 1 ♂, 23 June (J. Gillespie).

Tetragoneuria cynosura Say.

PENNSYLVANIA: Central Square, Wyola, Broomall, 22 May–6 June.

NEW JERSEY: Upton, 1 ♂, 29 April.

Tetragoneuria semiaquea Burmeister.[7]

NEW JERSEY: Upton, 3 ♂, 29 Apr.; 2 ♂, 1 ♀, 13 May; 7 ♂, 4 ♀, 20 May.

T. semiaquea was abundant and easily collected at this locality. The writer believes that this form is specifically distinct from *T. cynosura*. Wing coloration, size and color of abdomi-

[7] This is *semiaquea* as defined by Muttkowski [Bull. Wisc. Nat. Hist. Soc., 9 (3): 118–122, July, 1911].

nal spots, width of abdomen, and general size all set it apart from *cynosura*, though no structural differences are apparent.

Somatochlora tenebrosa Say.

PENNSYLVANIA: Broomall, 1 ♂, 1 ♀, 16 July; 2 ♂, 1 ♀, 23 July; 1 ♂, 26 July; 3 ♂, 1 ♀, 2 Aug.; 2 ♀, 3 Aug.; 1 ♀, 4 Aug.; 1 ♀, 7 Aug.; 1 ♂, 10 Aug.; 1 ♂, 1 ♀, 11 Aug.; 1 ♀, 16 Aug.; 1 ♀, 27 Aug.

NEW JERSEY: Fisher's Dam, 1 ♂, 4 Sept. (J. Gillespie).

The oviposition site of *tenebrosa* was not discovered, but dried mud on the abdomens of several females indicates that the eggs were laid in mud, probably in a swampy spot. The nearby streams did not have muddy shallows or banks where this species might oviposit. A pair in coitu which was taken on 23 July suggests that oviposition site of *tenebrosa* is not far distant from the fields where it occurred so commonly in late July and early August.

Somatochlora filosa Hagen.

PENNSYLVANIA: Broomall, 1 ♀, 26 July; 1 ♂, 2 Aug.; 1 ♂, 5 Aug.

This is the first Pennsylvania record for *filosa*. It flew with *tenebrosa*, from which it was difficult to distinguish on the wing. The flight of *filosa*, however, is generally more sustained and involves more up and down motion.

Cordulia shurtleffi Scudder.

PENNSYLVANIA: Bear Meadows, 2 ♂, 16 June.

This species was moderately abundant along the sluggish stream which flows through the center of the meadows. It often hovered motionless over the water and then dashed swiftly to another spot a few feet away where it hovered again.

Dorocordulia lepida Hagen.

NEW JERSEY: Whitesbog, 1 ♂, 24 June (J. Gillespie).

Nannothemis bella Uhler.

NEW JERSEY: Upton Ponds, 4 ♂, 24 June; 2 ♂, 29 June; 4 ♂, 8 July; Whitesbog, 8 ♂, 3 ♀, 24 June; 3 ♂, 4 ♀, 29 June; 1 ♂, 1 ♀, 8 July; Whitesbog, 22 July (seen); Cecil, 1 ♂, 5 Sept.

This rather rare species has not been recorded previously for the month of September. This is a significant extension of its seasonal range.

Perithemis domita Drury.

PENNSYLVANIA: Central Square, 2 ♂, 3 ♀, 6 June; State College, 19 June; Broomall, 1 ♂, 20 July; Central Square, 1 ♂, 2 ♀, 10 Aug.; seen at Westtown Lake, 3 Sept.

NEW JERSEY: Batsto Pond, 1 ♂, 5 Sept.; Batsto Pond, 7 Sept. (seen).

Celithemis eponina Drury.

PENNSYLVANIA: Central Square, 1 ♂, 8 Aug.

NEW JERSEY: Fisher's Dam, 1 ♂, 28 Aug.; Batsto Pond, 1 ♂, 5 Sept.; seen at Fisher's Dam, 4 Sept.

Celithemis elisa Hagen.

NEW JERSEY: Upton Ponds, 16 ♂, 7 ♀, 24 June–12 August.

Celithemis monomelaena Williamson.

NEW JERSEY: Batsto Pond, 1 ♂, 5 Sept.; 1 ♂, 7 Sept.

On each occasion, five or more other individuals of *monomelaena* were seen in addition to the one captured. Oviposition was observed on 5 September. These are exceptionally late records for this species.

Celithemis martha Williamson.

NEW JERSEY: Upton Ponds, 5 ♂, 1 ♀, 24 June; 3 ♂, 1 ♀, 29 June; 3 ♂, 1 ♀, 30 June; 8 ♂, 4 ♀, 8 July; 2 ♂, 22 July; 5 ♂, 12 Aug.; Whitesbog, 1 ♀, 29 June; Upton, 1 ♀, 12 Aug.; Fisher's Dam, 1 ♂, 28 Aug.; Batsto Pond, 1 ♂, 7 Sept.

Celithemis ornata Rambur.

NEW JERSEY: Upton Ponds, 1 ♀, 29 June.

Although this species is widely distributed in North Carolina and states to the south, it has never been reported from any point north of that state. This capture extends the range of *ornata* more than three hundred miles, into the Upper Austral life zone. Except for an individual seen on 24 June, which is presumed to be the same one captured on the above date, no other *ornata* were seen.

(*To be continued*)

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

The Number of Species in a Genus. Wm. T. M. Forbes in this journal (vol. 56, p. 279, Dec., 1945) arrives mathematically at the conclusion that "the ideal number would appear to be about 20 or 30" species in a genus, and then states "Actually, of course, the numbers in a proper classification would not be definite, but would vary enormously." The latter is true.

If we plot the numbers of species in the genera of any larger group against the number of genera including those numbers of species, we find on one end of our graph a large number of monotypical genera and on the other end a few very large genera. We furthermore find that the intermediates are distributed in a characteristic "hollow curve." This phenomenon was discovered by J. C. Willis in 1922,[1] recently extended by the same author,[2] and discussed by Sewall Wright,[3] Ernst Mayr,[4] and Stanley Cain.[5]

In Hampson's revision of the moths of the family Arctiidae (Cat. Lepidoptera Phalaenae Brit. Mus., vol. 3, 1901) the numbers of species in the genera are as follows, the number of species in a genus being followed in parentheses by the number of genera including that number of species. 1 (69), 2 (14), 3 (14), 4 (8), 5 (4), 6 (3), 7 (4), 8 (4), 9 (4), 10 (4), 12 (2), 13 (1), 15 (2), 17 (3), 18, 21 (1 each), 22 (2), 24, 25 (1 each), 29 (2), 34, 58, 61, 126 (1 each) = 934 species in 148 genera. This results in an average of 6.3 species to a genus, but as a

[1] Willis, J. C. 1922. Age and area. Cambridge Univ. Press.

[2] ———. 1940. The course of evolution by differentiation or divergent mutation rather than by selection. Cambridge Univ. Press.

[3] Wright, S. 1941. The "Age and Area" concept extended. Ecology 22 (3) : 345–347.

[4] Mayr, E. 1942. Systematics and the origin of species. Columbia Univ. Press. See p. 288.

[5] Cain, S. 1944. Foundations of plant geography. Harper Bros. See pp. 224, 310, 315.

matter of fact there are only 3 genera of 6 species and 4 genera of 7 species. The "ideal" number of species per genus would seem to depend upon the phylogenetic nature of the genus.

The Diptera of the subfamily Ulidiinae (Hendel, Gen. Ins., Fasc. 106, 1910) are comprised in 156 species distributed among 26 genera, as follows. 1 (17), 2 (6), 3 (1), 4 (1), 8 (1), 9 (2), 11 (1), 29 (1), 54 (1). This is an average of exactly 6 species per genus, but there is no genus with 6 species and only one each with the nearest numbers to 6.

The family Carabidae in Blackwelder's checklist of the Coleoptera of Central and South America (U. S. Nat. Mus. Bull. 185, 1944) includes 3939 species in 307 genera, as follows. 1 (104), 2 (45), 3 (17), 4 (19), 5 (11), 6 (12), 7 (6), 8 (11), 9 (6), 10 (7), 11 (7), 12 (3), 14 (3), 16 (2), 17 (2), 19 (4), 20 (2), 22 (2), 23 (1), 24 (4), 25 (3), 26 (2), 27 (1), 29 (3), 32, 33, 35, 38, 40 (1 each), 43 (3), 46, 47, 51, 54, 55 (1 each), 57 (2), 74, 80, 101, 112, 115, 124, 141, 167, 221, 330, 332 (1 each). This time the average is 12.8 species per genus.—GEORGE C. STEYSKAL.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Beaumont, J. de.—Systématique et croissance dysharmonique. [14] 19: 45–52. **Bornebusch, C. H.**—Animal life in relation to vegetation and soil. [7] 23:

240–254. **Brues, C. T.**—Future of Entomology. [90] 80: 19–21, 1946. **Hayes, W. P.**—Taxonomic type names and identification terms used for immature insects. [19] 40: 123–127. **Poisson & Patay.**—A propos de la destruction des insects parasites par des matières "inertes." [5] 17: 37–40. **Wilson, G. F.**—Insects pests of Cotoneaster horizontalis. [12] 70: 271–275, ill., 1945. (Hemiptera & Lepidoptera.)

ANATOMY, PHYSIOLOGY, MEDICAL—Anthon, H.—Structure of the head of dipterous larvae: Olbiogaster sp. (Rhyphidae). [7] 23: 303–320. **Bolwig, N.**—Vitamin E on larvae of honey bee. [7] 22: 295–298. **Christensen, P.**—Serosa and amnion of Lepidoptera. [7] 23: 204–223. **Faester, K.**—Biological observations on Crabro planifrons Thoms. (Fam. Sphegidae). [7] 24: 97–114. **Haarlov, N.**—Chaetotaxis of tarsus 1 in some Merostigmata. [7] 23: 273–294. **Kettlewell, H. B. D.**—Female assembling scents. [9] 89: 8–14. **Krogh, A.**—Some experiments on the osmoregulation and respiration of Eristalis larvae. [7] 23: 49–65. **Larsen, E. B.**—Importance of master factors for activity of Noctuids. [7] 23: 352–374. **Lemche, H.**—On genetics of Ephestia Kuhniella Zell. (Lep. Pyral.). [7] 23: 37–48; 24: 127–157. **Mohr & Mossige.**—Cytogenetic analysis of the spontaneous 3rd. Chromosome deficiency vein in Drosophila melanogaster. [18] 1942: 7: 1–51, ill. **Nielsen, S.**—Biology of Cicindela campestris L. [7] 24: 170–174. **Nielsen, E. T.**—X-ray observations on the passage of food in Orthoptera. [7] 23: 255–272. **Norgaard, E.**—Feeding habits of Linyphia (Aran.). [7] 23: 82–100. **Salt & Seamans.**—Experimental starvation of larvae of pale western cut-worm. Agrotis orthogonia Morr. [4] 77: 150–155. **Silvestri, F.**—Intercastes of Syntermes grandis (Rambur) caused by a protozoan. [Acta] 9: 77–89 (S). **Wesenberg-Lund, C.**—On Biology of Chironomidae. [7] 23: 179–203. **Wolff, N. L.**—Asymmetrical Lepidoptera: somatic mosaics. [7] 23: 443–456.

ARACHNIDA & MYRIOPODA—Haarlov, N.—(See Anat., etc.) **Lees, A. D.**—Water balance in Ixodes ricinus L. and certain other species of ticks. [116] 37: 1–20, 1946. **Lewis, E. A.**—Nairobi sheep disease: The survival of the virus in the tick Rhipocephalus appendiculatus. [116] 37: 55–59. **Lewis, Piercy & Wiley.**—Rhipicephalus neavei Warburton, 1912, as a vector of East Coast Fever. [116] 37: 60–64. **Milne, A.**—Ecology of the sheep tick, Ixodes ricinus L. Distribution of the tick on hill pasture.

[116] 37: 75–81. **Norgaard, E.**—(See Anat., etc.) **Radford, C. D.**—Notes on Trombicula deliensis Walsh, 1923 (Acarina; Trombidiidae) with description of the adult. [116] 37: 42–45, ill. **Smith, C. N.**—Biology and control of the American dog tick. [U.S.D.A. Tech. Bull. 905] 1–74, ill., 1946.

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Review

THE ADELID MOTHS OF SOUTH AFRICA. THE MOTHS OF SOUTH AFRICA. Vol. IV, Part 2. By A. J. T. Janse.

I suppose most lepidopterists can recall their surprise when they first caught an adelid, one of those minute delicate things with excessively long antennae. Dr. Janse remarks on their strong resemblance to the trichopterids of the family Leptoceridae and speculates on a possible caddis-fly ancestry for them, perhaps more direct than in any other group of Frenatae. The maxillary palpi and the male genitalia tend to support this idea.

About 250 species are described from all over the world, and of these 68 are recorded from South Africa. The genus Adela has only two recorded South African species, but *Ceromitia* has the great majority of its species in that region. Janse divides *Ceromitia* into three groups, based primarily on the male genitalia. He says: "It is doubtful whether one can consider these three groups as true genera, so I here treat them as subgenera, writing, for example, *Agisana turpis,* instead of *Ceromitia* (*Agisana*) *turpis.*

Of the S. African Adelidae, two were described by Walker, two by Zeller, four by Walsingham, one by Stainton, 34 by Meyrick and 25 now by Janse. As in all Janse's work, the descriptions are excellent and the drawings of structures are exquisite, while the various moths are illustrated by enlarged photographs. Although this book is on the African fauna it should be in the hands of all lepidopterists, who will learn much from it.—T. D. A. COCKERELL.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tripulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

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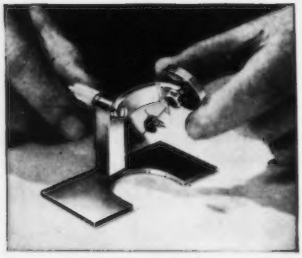

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